

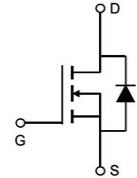
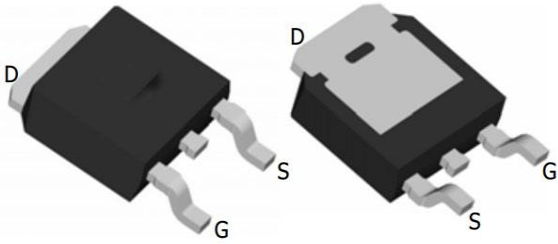
**40V /50A Single N Power MOSFET**
**General Description**

40V /50A Single N Power MOSFET

 Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5\text{ V}$ 

Pb-free lead plating; RoHS compliant

<b><math>V_{DS}</math></b>	40	V
<b><math>R_{DS(on),TYP@V_{GS}=10V}</math></b>	4.9	m $\Omega$
<b><math>R_{DS(on),TYP@V_{GS}=4.5}</math></b>	6.7	m $\Omega$
<b><math>I_D</math></b>	50	A



Part ID	Package Type	Marking	Tape and reel information
SM4184T9RL	TO-252	50N04	2500


 100% UIS Tested  
 100% Kg Tested

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	20	$\pm V$
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ C$	A
		$T_A=70^\circ C$	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	80.0	
Avalanche Current <sup>C</sup>	$I_{AR}$	16.0	
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AR}$	36.8	mJ
Power Dissipation <sup>A</sup>	$P_D$	$T_A=25^\circ C$	W
		$T_A=70^\circ C$	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	23	35	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady State	47	57
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	14	22	$^\circ C/W$



**STATIC PARAMETERS**

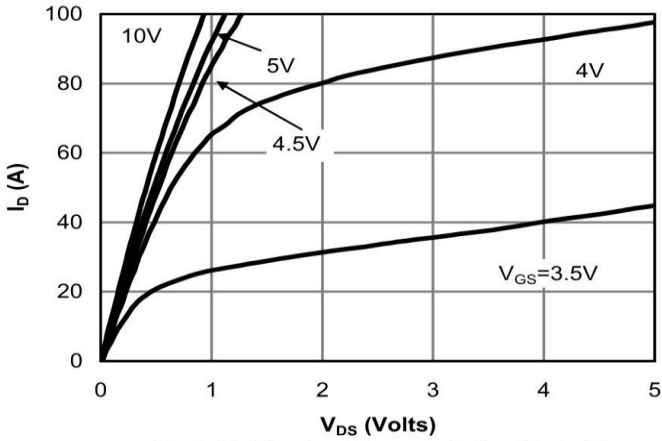
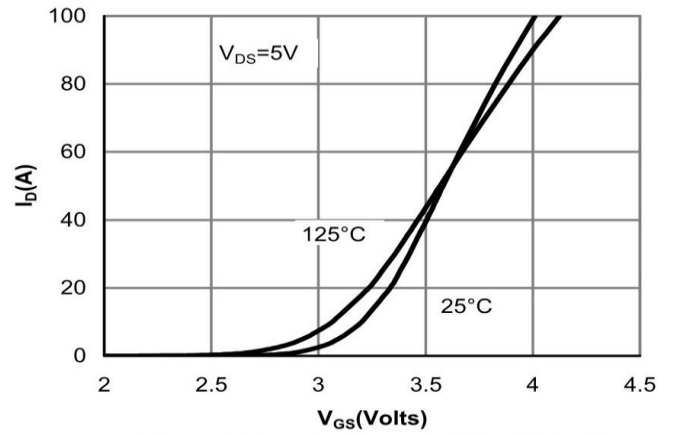
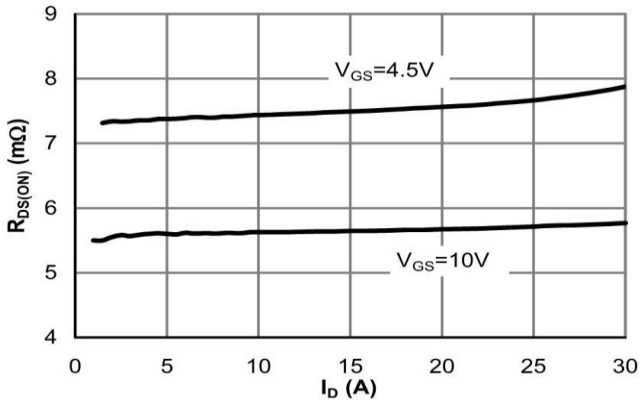
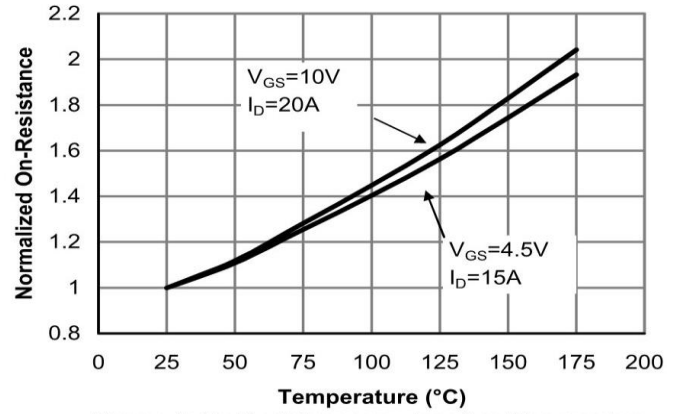
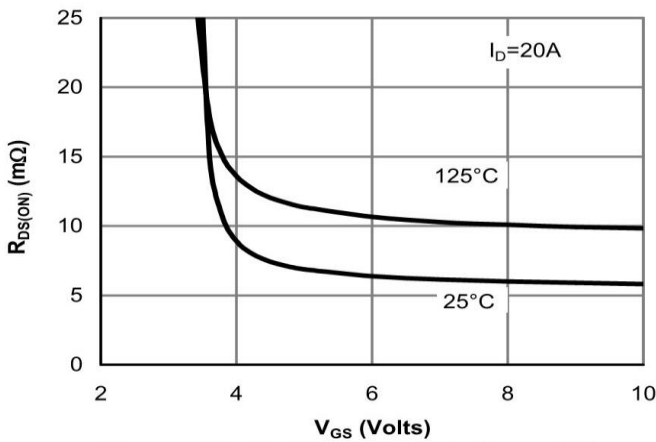
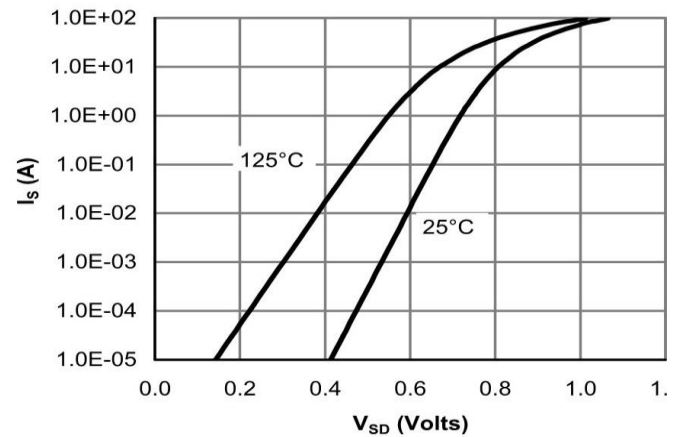
Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> = -250uA, V <sub>GS</sub> = 0V	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V			1 5	uA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = 250µA	1.3	2	2.6	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		4.9	7.0	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		6.7	9.5	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		57		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =172V		0.72	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				50	A

**DYNAMIC PARAMETERS**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		1500	1830	pF
C <sub>oss</sub>	Output Capacitance			215	264	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			135	160	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz			3	Ω

**SWITCHING PARAMETERS**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A		14		nC
Q <sub>g</sub> 4.5V)	Total Gate Charge			7		
Q <sub>gs</sub>	Gate Source Charge			4.2		
Q <sub>gd</sub>	Gate Drain Charge			6		
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3Ω		14.5		ns
t <sub>r</sub>	Turn-On Rise Time			11.6		
t <sub>D(off)</sub>	Turn-Off DelayTime			40.6		
t <sub>f</sub>	Turn-Off Fall Time			13.05		
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-8A, dI/dt=500A/µs		29		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =18A, dI/dt=500A/µs		26		nC

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Fig 1: On-Region Characteristics (Note E)**

**Figure 2: Transfer Characteristics (Note E)**

**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**

**Figure 4: On-Resistance vs. Junction Temperature (Note E)**

**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

**Figure 6: Body-Diode Characteristics (Note E)**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

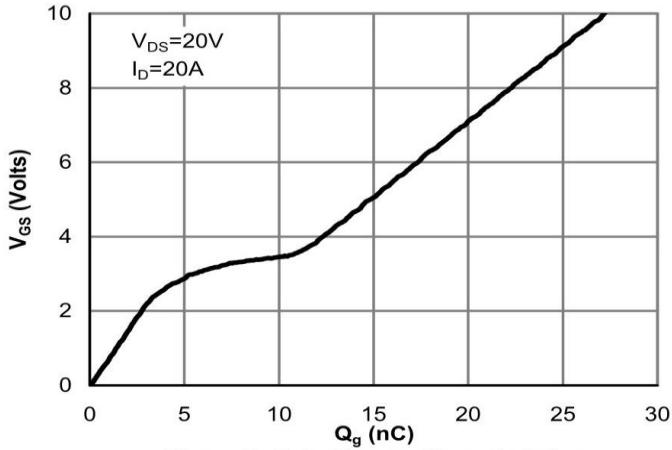


Figure 7: Gate-Charge Characteristics

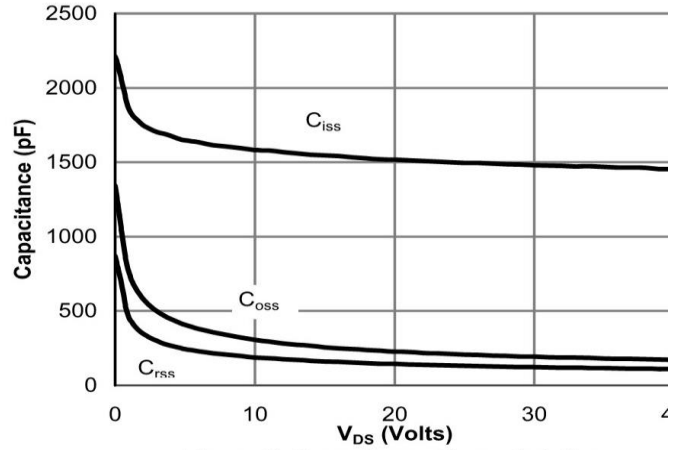


Figure 8: Capacitance Characteristics

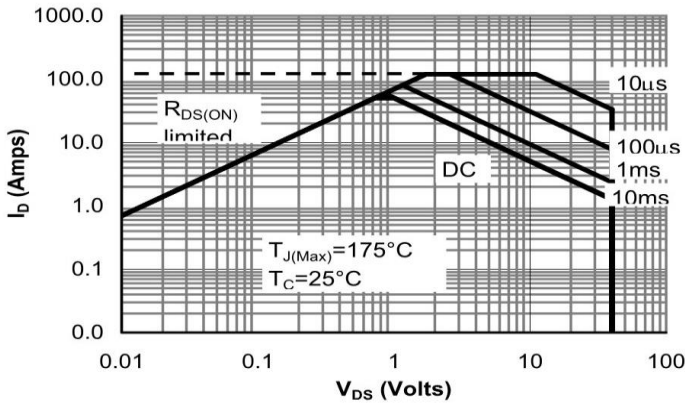


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

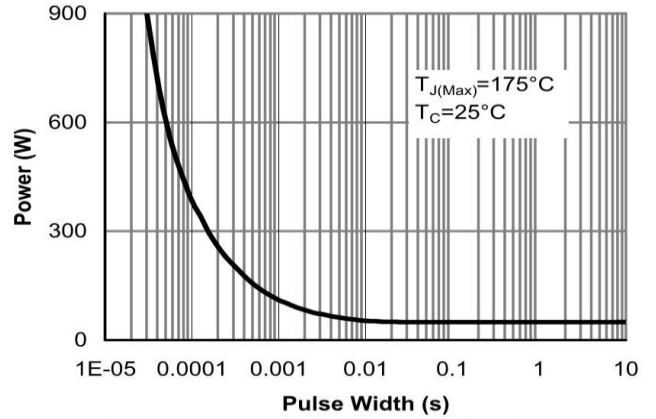


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

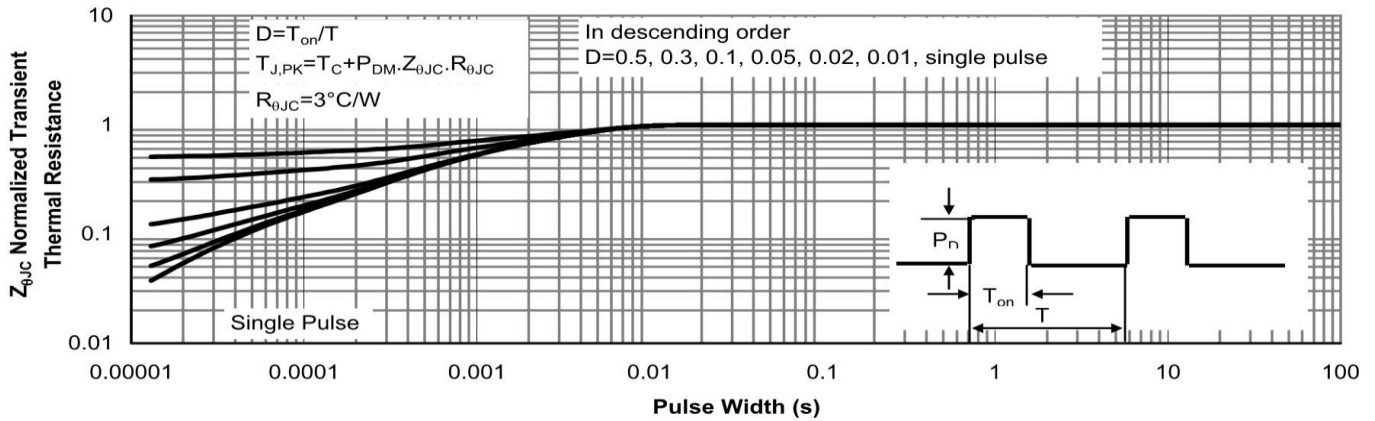


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)